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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,298	09/26/2003	Shiow-Hwei Hwang	KLA1P067/P995	4459
22434	7590	11/16/2005	EXAMINER	
BEYER WEAVER & THOMAS LLP			CONNOLLY, PATRICK J	
P.O. BOX 70250			ART UNIT	
OAKLAND, CA 94612-0250			PAPER NUMBER	
			2877	

DATE MAILED: 11/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/672,298

Applicant(s)

HWANG ET AL.

Examiner

Patrick J. Connolly

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-38 and 43 is/are allowed.
- 6) ☒ Claim(s) 39 and 44-53 is/are rejected.
- 7) ☒ Claim(s) 40-43 and 54-58 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2.25.2004.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

The disclosure is objected to because of the following informalities:

Page 1, line 10 requires an Application Number.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

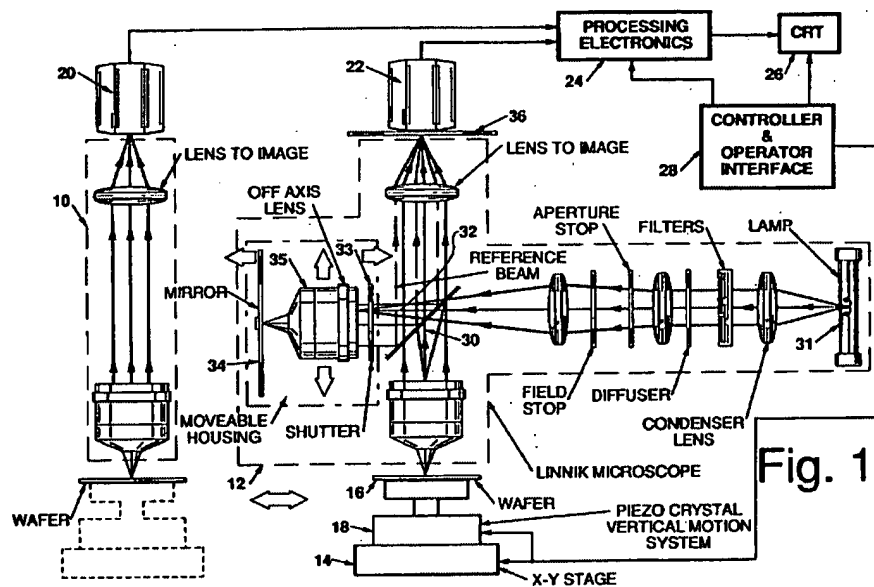
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 39 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by U.S. Patent No. 5,112,129 to Davidson et al (Davidson hereafter).

As to claim 39, Davidson teaches a method of image enhancement for the coherence probe microscope with applications to integrated circuit metrology including (see Figure 1 below):



at least one illumination source to generate an illumination beam (31, LAMP);

an interferometric microscope module for splitting the illumination beam into a test beam directed to the semiconductor sample and a reference beam towards a reference mirror (MIRROR), and combining into a combined beam the test beam reflected from the sample and the reference beam reflected from the reference mirror, the combined beam forming an interference image;

a switching mechanism (SHUTTER) for switching the operation of the inspection system between interferometric measurement and topographic measurement (The shutter above blocks the reference beam so that an interference image and a non-interference topographic image can be measured);

an image sensor (22) for acquiring the interference image from the interferometric microscope module and generating an interference image signal; and

a processing module (24) configured to generate from the interference image signal one of topographic measurements and complex field information corresponding to the semiconductor sample (see also columns 4-8 and Figures 7 or 11) .

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 44-53 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by U.S. Patent No. 6, 480,285 to Hill (hereafter Hill).

As to claim 44, Hill discloses a method of interference microscopy for wafer or mask inspection including (see claims 34-36 or claims 44-46).

combining a test wave reflected from a first portion of a wafer and a reference wave reflected from a reference mirror to produce on an image sensor an interference optical image;

reconstructing complex field information for the first portion from the interference optical image;

generating a first signal representation of the first portion of the wafer using reconstructed complex field information; and

comparing the first signal representation to a second signal representation of a wafer to generate a resultant signal representation, wherein the resultant signal representation is used to identify defects in the first portion of the wafer .

As to claim 45-47, Hill discloses both signals coming from the same wafer, a database of ideal wafers or different wafer measurements.

As to claim 48, Hill discloses both spatial and temporal fringe analysis (see columns 45-47).

As to claim 49, Hill discloses complex phase and amplitude analysis (see column 45-47).

As to claims 50-52, Hill discloses image processing to reduce noise (see column 47).

As to claim 53, Hill discloses identifying defects by comparing to known defects (see claims 34-36 or claims 44-46).

***Allowable Subject Matter***

Claims 1-38 and 43 allowed.

Claims 40-42 and 54-58 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As to claim 40, the prior art of record, taken alone or in combination, does not disclose an interferometric inspection system including an illumination source comprising a coherent and broadband source, in combination with the rest of the limitations of claim 40.

As to claim 41, the prior art of record, taken alone or in combination, fails to disclose or render obvious an interferometric inspection system including a switching mechanism

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comprising a dichroic surface located in the optical path between the interferometric microscope module and the reference mirror, in combination with the rest of the limitations of claim 41.

As to claim 42, the prior art of record, taken alone or in combination, fails to disclose or render obvious an interferometric inspection system including a switching mechanism comprising a shutter located between the illumination source and the interferometric microscope module, in combination with the rest of the limitations of claim 42.

As to claim 54, the prior art of record, taken alone or in combination, fails to disclose or render obvious a method of interferometric inspection including: adjusting the magnification of an interference image in fine increments to align portions of an interference image corresponding to similar features from 2 different portions of a wafer with pixel locations on an image sensor, in combination with the rest of the limitations of claim 54.

As to claim 55, the prior art of record, taken alone or in combination, fails to disclose or render obvious a method of interferometric inspection including: identifying and comparing a feature in an interference image with a location of a similar feature in a stored image to determine the misalignment between the interference image and the stored image to generate an alignment signal.

The following is an examiner's statement of reasons for allowance:

As to claims 1 and 21, the prior art of record, taken alone or in combination, fails to disclose or render obvious an apparatus for interferometric inspection including: an alignment module located in the optical path between the interferometric microscope module and the image sensor for adjusting at least one of the orientation and position of the interference image relative to the image sensor, in combination with the rest of the limitations of claims 1 and 21.

As to claim 11, the prior art of record, taken alone or in combination, fails to disclose or render obvious an interferometric inspection system including: an adjustable magnification module located in the optical path between the interferometric microscope module and the image sensor for adjusting the size of the interference image onto the image sensor, in combination with the rest of the limitations of claim 11.

As to claim 14, the prior art of record, taken alone or in combination, fails to disclose or render obvious an interferometric inspection system including: at least one illumination source for generating a coherent illumination beam and an incoherent illumination beam; and a switching mechanism for switching the operation of the inspection system between interferometric inspection and topographic measurement, in combination with the rest of the limitations of claim 14.

As to claim 43, the prior art of record, taken alone or in combination, fails to disclose or render obvious an interferometric inspection system including: an adjustable magnification module to provide fine adjustment of the size of the interference image onto the image sensor; and an alignment mechanism located in the optical path between the interferometric microscope module and the image sensor to provide adjustment between the interference image and the image sensor by compare a location of a feature in the interference image with a location of a similar feature in a stored image to generate an alignment signal to determine the misalignment between the interference image and the stored images, in combination with the rest of the limitations of claim 43.



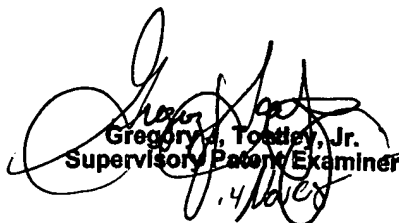
Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick J. Connolly whose telephone number is 571.272.2412. The examiner can normally be reached on 9:00 am - 7:00 pm Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571.272.2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

pjc P7C  
11.19.2005

  
Gregory J. Toatley, Jr.  
Supervisory Patent Examiner  
11/19/05